The publication of such "eye-sores" can be so easily prevented by either author, editor or engraver that it should not be allowed to continue any longer. Of course in some cases, as in views of lakes and rivers, there may not be any distinct vertical or horizontal lines to guide the trimmer; but in such cases one may sometimes get his bearings by remembering that any point and its reflection in a body of still water are always in the same vertical line, except in the case of objects (such as birds) moving rapidly from the observer's right to left, or *vice versa,* and photographed with a focal-plane shutter traveling vertically.

Roland M. Harper

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Another Sex-Limited Character

To the Editor of Science: From work done this spring on the inheritance of mammæ in swine, the writer has apparently discovered a new sex-limited character in the behavior of rudimentaries. These rudimentaries are the ones located low on the scrotum of the male, and well to the rear on the inside of the thigh of the female. The method of inheritance corresponds to the appearance of horns in Wood's crosses in sheep.

The males used by the writer both possessed rudimentaries on the scrotum and were heterozygous in nature if the interpretation is correct. Two ages of sows were used, gilts or sows just turned a year old, and sows that had just become two years of age. The results are depicted in the following table, the symbols being as follows: *R* equals factor for presence of rudimentary, *r* equals absence of same. *RR* equals rudimentaries in both sexes, *Rr* equals presence in male and absence in female, and *rr* equals absence in both sexes.

In the second table the deviation of the actual from the theoretical is wider than the writer would like, but is scarcely significant. The number of gilts are only seventeen and the average of pigs per gilt is less than with the sows. Both of these factors should complicate the results as to chance. Since there is no appearance of rudimentaries where they are not expected the writer feels that the theory is justified in spite of the deviations.

Sows mated to old boar (*Rr*)

Gametic Composition Sows	No. Sows		Boars		Sows	
			Absent	Present	Absent	Present
RR	5	Expectation	0	26	11	11
		Actual	0	26	14	9
Rr.....	9	Expectation	9	27	36	12
		Actual	11	25	34	14
rr	18	Expectation	46	46	84	0
		Actual	48	45	84	0

Gilts mated to young boar (*Rr*)

RR	4	Expectation	0	13	8	8
		Actual	0	13	13	4
Rr.....	5	Expectation	5	15	21	7
		Actual	7	13	18	10
rr	8	Expectation	19	19	23	0
		Actual	23	15	23	0

The gilts are from the sows listed in the first table and thus there are available three generations for study. The gametic composition assigned the gilts as a result of their behavior in breeding is confirmatory in every case of the composition assigned the sows.

The writer is not dogmatic in his interpretation and welcomes suggestions that may help reconcile the slight differences present.

Edward N. Wentworth

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Scientific Books

Phylogeny of the Echini with a Revision of Palæozoic Species. By Robert Tracy Jackson. Memoirs of the Boston Society of Natural History, Vol. 7. Boston: Printed for the Society with aid from the Gurdon Saltonstall Fund, January, 1912. Quarto, 491 pages with 256 text-figures and 76 plates.

The discovery of the actual phylogeny of any group of animals involves not only the combined study of the morphology and development of those animals as they exist to-day, but also the more difficult and laborious study of their fossil remains. The true phylogenist

is seriously handicapped when he deals with a group, which is poorly represented in nature's great museum, the earth's crust, and happy is he if he can find abundant material in that wonderful storehouse. Doubly fortunate is he if his training enables him to get the most from such material. One of the greatest absurdities of our persistent and no doubt necessary tendency to classify men as well as objects is the grouping by themselves as "paleontologists" those who have had this training and who specialize in the study of fossil organisms. For if a man who uses as his material the long-dead and oftentimes badly preserved animals of our museums is a zoologist, is not the man who studies in the same way similar remains preserved in the strata of the earth, just as truly one? Do either the length of time since the death of the animal or the method by which its remains have been preserved matter? Perhaps a line might be drawn between those who study fossils simply as indicators of geological horizons having in view the history of the earth as an object by itself, and those who study them as the remains of living beings whose structure throws light on the problems of phylogeny, but the latter at least are zoologists (or botanists, as the case may be) and when they combine with their paleozoology thorough knowledge of the structure and development of Recent animals, they make the best possible phylogenists. When such a worker selects for study a small sharply-defined group with a rich geological history and abundant Recent material available, and devotes years of time and the most unflagging industry to his task, the results can not fail to be of prime importance to zoologists of all sorts, everywhere.

Few groups of animals are better adapted for such study than the echini. So sharply defined is the class that its ancestry is hidden in oblivion and not a single connecting link with any other class is known. There is no animal either Recent or fossil of which it can not be affirmed either "this is" or "this is not an echinoid." Moreover, the class is relatively small, only about five hundred living species being known with perhaps three times as many fossil. The latter occur in all geological periods from the Ordovician to the Recent. Much of this material is beautifully preserved too, at least so far as essential structures go, for the hard test and lantern of a sea-urchin are exceptionally satisfactory objects for geological preservation. Finally sea-urchins have long been favorite objects of study, and their anatomy, development and life history are as well known as those of any marine invertebrates. If, therefore, the investigation be undertaken by the right man, the possibility of really working out the history of the group, were unusually favorable, and it is but the simple truth to say that in his "Phylogeny of the Echini" Dr. R. T. Jackson has shown himself to be that man. This monumental work sets forth the actual developmental and evolutionary history of the echini so fully, so fairly and so convincingly that it may be said with little fear of contradiction, there is no other group of animals of equal importance the main lines of whose phylogeny are more definitely and certainly known. Moreover so extraordinary is the amount of accumulated fact and so suggestive are the interpretations offered that there is something of interest in the volume for every one attracted by the problems of evolution, be he zoologist or botanist.

The book is dedicated most appropriately to Alexander Agassiz and Alpheus Hyatt, the former the Nestor of students of echini, the latter the originator or promoter of the principles and methods to which Jackson is himself so ardently loyal. Indeed the most striking characteristics of the volume are the emphasis placed on "stages in development" and the persistence with which the facts are marshalled in support of the "recapitulation theory." Those who deny the existence of stages and the validity of the recapitulation theory will find it exceedingly difficult, if not impossible, to meet the arguments and interpretations with which the writer defends his position. Second only to the emphasis on stages is the stress laid on variation and its significance. In the introductory pages, variations are grouped under five heads (*arrested,*

regressive, progressive, parallel, aberrant) and the meaning of each term is clearly explained. That variation is nearly always significant and that its significance may be determined are two cardinal principles which the reader of this book can scarcely doubt.

The terminology adopted by Jackson is as free from technicalities as possible and there are scarcely any new terms introduced. Those which are proposed, as for example "mid-zone," are simple, readily understood and meet a real need. In the case of such terms as have been used in different senses by previous authors, as "peristome," Jackson has adopted that usage which has appealed to him as simplest and least open to misunderstanding, and consequently even those who prefer a different sense can not mistake his meaning.

The extensive investigations which Jackson has made into the morphology of Recent echini have led him to some interesting discoveries of structures hitherto overlooked. A notable illustration of this is the presence or absence of pits in the upper end of the half-pyramids which compose the lantern. These pits have apparently been overlooked hitherto, though they seem to be of real systematic importance and even of ordinal value.

In his choice of generic and specific names Jackson has followed the International Code, but not at the expense of his judgment or common sense. As an illustration of his mental attitude, his sensible treatment of *Archæocidaris vs. Echinocrinus* is illuminative. Nobody questions that *Echinocrinus* has priority, but Jackson well says: "This name, however, is misleading, was based by Professor Agassiz on a misconception of affinities and has been abandoned for some sixty years in favor of the entirely appropriate *Archæocidaris* of McCoy. . . . To revive the old name *Echinocrinus* . . . will make confusion at present and in future, and no gain to any one." Another taxonomic snarl which Jackson has courageously untangled is that involving the name *Diadema*. For years it has been known that this name belongs to a cirriped, although it has also been in use for a genus of butterflies and for one of the best-known genera of tropical sea-urchins. Students of the echini have persisted in its use and a family and an ordinal name based upon it are both universally adopted. Jackson's statement of the case (p. 27) is clear and convincing and his proposed substitutes *Centrechinus, Centrechinidæ* and *Centrechinoida* are appropriate and euphonious. Now that the Gordian knot is cut, it is to be hoped that zoologists will no longer use *Diadema* for either sea-urchin or butterfly.

Following his introductory pages, Jackson divides his book into three parts. The first of these is entitled "Comparative Morphology of Echini." It includes 168 pages, crowded with observations and interpretations of the typical structure of the test and lantern, and variations therefrom. One notes the absence of any discussion of the pedicellariæ and of the non-calcareous organs, but as these parts seem to have little phylogenetic significance the omission is perhaps not important. We may, however, hope that some zoologist will be moved to institute ere long a similar thorough comparative study of these less significant systems. So far as the pedicellariæ are concerned, Mortensen already has accumulated a mass of important material. Jackson's opening paragraph is a fine defense of the claim that paleozoology is only one aspect of zoology. Then follow sections on the form of the test, orientation, the pentamerous system and variation therefrom, the structure of the skeleton, growth, ambulacrum of the corona, interambulacrum, basicoronal plates, imbrication, spines, peristome, ocular and genital plates, periproct, Aristotle's lantern and perignathic girdle. It is impossible in a review like this to give any adequate conception of the wealth of these sections; only the most striking features may be noted. The repeated references to Lovén and his work show in what high esteem he is held, while the constant emphasis on the significance of both normal structures and variations is very noticeable. Variants from pentamerous symmetry are shown to be exceedingly rare; only 25 were recorded prior to Jackson's work, but he has studied 71, of which 60 were found in the fifty thousand Recent echini personally examined by him.

He arranges these variants in twenty groups, showing that tetramerous specimens, though rarely completely symmetrical, are the most common. The study of both normal and variant tests led Jackson to the conclusion that the interambulacral plates are merely space fillers and always originate against the oculars. He therefore holds that the test of a sea-urchin consists, not of ten equally important areas, but of *five* only. Each of these is capped by an ocular plate, beneath which arise the two columns of ambulacral plates with one or more columns of space-filling interambulacrals on either side. The growth of the test seems to take place chiefly on its outer surface. That the inner is more primitive is pointed out and demonstrated by interesting evidence. Much stress is laid on resorption of the calcareous matter during growth as a developmental factor, particularly in relation to the peristome. The matter of imbrication or non-imbrication of coronal plates is not considered to be of special phylogenetic importance. The covering of the peristome is carefully considered and six different types are pointed out. A new term, "non-ambulacral," is introduced in this connection, which is to be welcomed as accurate and useful; it is applied to those plates of the peristome which are not homologous with any of the coronal plates.

The section discussing the mutual relationships of ocular and genital plates occupies 79 pages and is one of the most remarkable contributions to echinoid morphology which has yet been made. With a patience and zeal most extraordinary, Jackson has personally studied fifty thousand specimens of 137 species of Mesozoic and Recent regular echini and has thus inspected, not hastily and casually, but with real care, a half million genital and ocular plates! Certainly results and opinions reached after such a study are worthy of more than ordinary consideration. The chief conclusions to which the author comes are as follows:

1. The position of oculars and genitals with reference to each other and to the periproct is not dependent on size or age in adults, but is a species character. Of course, like all specific characters it is more firmly fixed in some cases than in others, but in only a very few cases is there any room for question as to what the species character in this particular is. From a purely taxonomic standpoint this discovery is of very great importance, but its chief interest lies in its phylogenetic bearings, upon which Jackson very properly lays particular emphasis.

2. In Recent regular Echini (except perhaps the Aspidodiadematidæ) the oculars in very young individuals are all exsert (*i. e.*, not in contact with the periproct); they are shut out by the five genitals forming a closed ring. As the individual grows, however, one or more, even all, may become insert (*i. e.*, reach and touch the periproct) thus separating the adjoining genitals. The species character is, however, reached very early in life in most echini, when the individual is less than half grown, often when it is still but a few millimeters across. Even the variants which progress beyond the species character are found almost wholly among the small specimens. Exceptionally large and fine specimens generally show the species character.

3. Of the 32 possible arrangements of ocular plates with reference to the genitals, ranging from all exsert to all insert, only 22 were found and of these 14 were so rare that they all together characterized only about 1.5 per cent. of the specimens. The other eight have a very fixed and characteristic order of appearance. For example if two oculars only are insert in the adult, they are the two of the bivium (*i. e.*, oculars I., V.); if three, they are these two plus ocular IV., and if four, they are these three plus ocular II. The variations from this sequence are exceedingly interesting and important and are very fully discussed.

4. The first ocular to become insert appears to indicate a family character; it is usually ocular I., but in the Cidaridæ, in the Arbaciidæ and also in the Echinometridæ it is ocular V.

5. While the very small apical system of the Echinometridæ shows that a highly specialized family does not necessarily have a large apical disk, with oculars all insert, it appears to be

true that within any given family the most specialized genus, and within any genus the most specialized species, has the largest number of insert oculars.

Aside from these important general conclusions, mention should be made of the occurrence of what may be called "right-oculared" sea-urchins in species which normally are "left-oculared," *i. e.*, some individuals have oculars I., V., II. insert, when I., V., IV. is the species character. Also deserving of special note are the remarkable peculiarities of the echini of the west coast of South America. Particular attention should be called to the invaluable tables on pages 100, 142, 143 and 154–164 and to the diagram (Fig. 176) on page 153. The detailed studies of the development of the apical disk in *Strongylocentrotus dröbachiensis* and of geographical variation in that species and several others, notably *Tripneustes esculentus,* deserve far more than the passing commendation possible here.

A discussion of the special characters of genital plates occupies pages 165–173, among the interesting points considered being the exclusion of genitals from the periproct, the fusion and splitting of genital plates, and the number and position of the genital and madreporic pores. The characteristics of the periproct occupy four pages and the very important point is emphasized that the so-called suranal plate is not a primitive but a secondary feature. More than twenty pages are filled with a discussion of the "Aristotle's lantern," including its muscles, and the perignathic girdle which is really a part of the same organic system. The pits, already mentioned, which were discovered in the tops of the half-pyramids of the Centrechinoida, are described here. Stress is laid on the importance of the structure of the lantern and teeth for purposes of classification and the Centrechinoida is divided into three very satisfactory suborders (*Aulodonta, Stirodonta, Camarodonta*) based primarily on these characters. The fundamental differences between auricles and apophyses are clearly pointed out and all the known varieties of each are discussed. One finishes the reading of this first part of the volume with amazement at the array of facts it contains and with admiration at the way in which they are marshalled and the common sense with which the conclusions are drawn. There is no attempt to be startling and the newly discovered facts are not made the bases of wild hypotheses, but each theoretical conclusion is presented with the facts in support of it so fairly, so open-mindedly, as to carry great conviction.

To the taxonomist Part II., "Systematic Classification of Echini," which fills pages 199–234, will prove of particular interest. The author begins with a brief statement regarding his inability to accept Dr. Mortensen's divisions based on differences in the pedicellariæ and states the principles which have guided him. The recently suggested close relationship between echini and crinoids is emphatically disapproved, nor is any direct connection between sea-urchins and starfishes deemed at all probable. The original stock from which the echini have sprung is very likely to be found among cystoids. The "Key" beginning on page 201 includes all the orders of echini accepted or proposed by the author, all the families of regular Recent echini and all the families and genera of the Paleozoic era. This key is very fully elaborated, so that it is far more than the ordinary key. It might perhaps be called a synopsis, but as it is arranged in the customary dichotomous form it is very usable and will prove most helpful to all workers on either Recent or fossil echini. Nothing of the kind has hitherto been available and the need has often been sorely felt. On page 209 is given a remarkable "bird's-eye view" of the phylogeny of the echini as worked out by Jackson. This family tree well deserves most careful study and brings home to the reader certain fundamental conclusions of the author which may be briefly stated here. (1) *Bothriocidaris* is the nearest known approach to the primitive echinoid stock and serves as the root, or, perhaps better, the trunk of the tree. (2) The remaining characteristic Paleozoic forms are not in any sense ancestral to our modern

echini, but represent totally different branches which reach their culmination in the Permian. (3) The Bothriocidaroid stock was the origin of a Cidaroid branch, which in turn gave rise to the Centrechinoida, and from this order all the other Recent echini have sprung. So firmly has Jackson grounded these conclusions on the facts of morphology, embryology and paleontology that it is difficult indeed to doubt their essential truth. Of course the time-honored divisions Palæechinoidea and Euechinoidea no longer have any use since they are artificial and unnatural.

Following the key are detailed accounts of each of the groups given therein. Part of this can not avoid being elaborated repetition, but there is added much that is important or suggestive, particularly concerning the interrelationships of the different groups. Great importance is very naturally given to the structure of *Bothriocidaris,* which is emphatically stated to be "the most primitive type of echini." Four new genera from the Paleozoic are described and their relationship to previously known forms is clearly brought out. The progressiveness of structure in the Palæechinidæ is emphasized and the ascending series is beautifully worked out, forming one of the most convincing demonstrations of "stages" imaginable. In this connection figure 237 on page 231 deserves special mention.

In Part III., "Paleozoic Echini," is to be found the more distinctively systematic and paleontological portion of Jackson's work, but it would be a great mistake for the phylogenist or student of variation to feel he could pass over this part superficially. It is crowded with details of morphology and of variation that are of very real importance. Besides forty species of *Archæocidaris,* most of which are based on fragments of spines or scattered plates, Jackson accepts eighty species of Paleozoic echini, grouped in 23 genera. Of these species, 22 are here described for the first time. The genera are grouped in eight families under four orders, but the Perischoechinoida with four families includes all the characteristic Paleozoic forms, of which satisfactory material is known, except *Bothriocidaris.* (The Cidaroida of course are not characteristic of the Paleozoic and the structure of the Echinocystoida can not be considered satisfactorily known.) After a brief introductory note there is an interesting chapter on "Geological Distribution" which will prove of particular interest to all who have little knowledge of paleozoology. Then follow the orders, families, genera and species in regular sequence for 208 pages. In view of its importance in Jackson's scheme, *Bothriocidaris* is again given particular attention. The very interesting fact is noted that this rare and extraordinary fossil was figured by Aldrovandus in 1618. Under the Cidaroida is given the description of a new species of *Miocidaris* from the Lower Carboniferous of Colorado. The discovery of this species is of the greatest interest and from Jackson's point of view of special importance. For the only argument against his phylogeny of the echini which presented serious difficulty was the apparent nonexistence before the Permian of echini with only two columns of interambulacral plates. While appeal might have been made with perfect propriety to the "imperfection of the geological record," that last resort of all hard-pressed phylogenists, it is far more satisfactory to have this beautifully preserved cidarid as tangible evidence of the existence of the order so far back in the Paleozoic.

In the consideration of *Palæodiscus,* the extraordinary interpretation placed on its structure by Sollas and Spencer is rejected and a perfectly natural explanation is offered of the appearance which has led to the unfortunate belief that the fossil represents a sort of connecting link between sea-urchins and starfishes. To make his record of Paleozoic forms complete, Jackson has included some forty species of *Archæocidaris* largely based on fragments but he is the first to admit (pp. 256, 257) that most of these have little paleontological, less systematic and no morphological interest. Of the new genera *Hyattechinus,* with three remarkable species, two of them new, is the most noteworthy as it has the largest number of columns of interambulacral plates known

among echini and the form of the test is, in each species, unusual. The genus similarly named in honor of Lovén is less remarkable, but is of interest because it forms one of the steps in the progressive differentiation of the Palæechinidæ. In this series, *Lovénechinus* is intermediate between *Maccoya* and *Oligoporus*. Under *Melonechinus* (this name having to replace the more familiar *Melonites*, which is preoccupied) particular stress is laid on the support which the study of that genus with its fourteen species gives to the recapitulation theory. The last genus discussed, *Meekechinus*, is a new one and like *Hyattechinus* of special interest, but in this case it is the ambulacra which are highly specialized, having in each area twenty columns of plates. The teeth also are remarkable in being serrate. Altogether this striking Permian genus is a fitting climax to the remarkable series of forms beginning in the Ordovician with *Bothriocidaris*. While no one will question the right of Hyatt, Lovén and Meek to the honor Dr. Jackson has done them in connecting their names with these interesting echini, those of us who are utterly opposed to the mixing of honor and sentiment with taxonomy must regret that impersonal generic names were not preferred.

In compiling such a systematic monograph as is presented in Part III., one invariably finds forms so imperfectly described or so incompletely known that it is virtually impossible to determine their relationship to those better known. Jackson has very wisely gathered these unsatisfactorily known forms among Paleozoic echini under two heads, "Incertæ Sedis" and "Nomina Nuda." Under the former are listed 35 species based on single plates, fragments of spines or incomplete and badly preserved tests. Many of these can be referred correctly to the family and some even to the genus, but, as their real relationship to the known forms can not be determined, it is a great advantage to have them listed in this way and not intercalated among the valid species where their dubious nature might easily be overlooked. There are eleven Nomina Nuda listed, of which *Heterocidaris keokuk* and *lævispina* Hall have a curious history, here given by Jackson in full. A half a dozen unrecognizable fossils, three of which may be Cystoids, are listed under the heading "Paleozoic Forms incorrectly referred to Echini." A very full bibliography of 248 titles and an equally satisfactory index covering 17 pages complete the book.

A special word is demanded by the illustrations with which the memoir abounds and which are as fine as they are abundant. With four unimportant exceptions, every Paleozoic species accepted in the text is figured and of many species particularly the more important forms, both photographs and drawings are used to show the appearance and structure. Moreover a large proportion of the figures are from the type specimens. The morphology of the test and lantern of Recent species is lavishly illustrated and interesting variants are equally well shown. Particular attention should be called to the "summary figures," if such a term may be used, showing important morphological characters as they appear in different groups of echini. Of these, that on page 54 illustrating the features of the ambulacra, the one on page 80 showing the various kinds of peristome and that on page 184, which gives the different characters of lantern and teeth, are of particular importance, but the others on pages 70, 134, 148, 193 and 197 are really of no less value.

The chief fault of the book, if one must be discovered, would seem to be occasionally unnecessary reiteration. This is of course only an exaggeration of a virtue due to the author's desire to set forth his facts with perfect clearness and to marshal them in vigorous support of "stages" and the recapitulation theory. The same facts or group of facts are sometimes repeated in several different places, though usually from different points of view. This is in part due to the arrangement of the book, by which general morphology is discussed first and is followed by the application to taxonomy and the detailed study of the Paleozoic forms. Of course the latter sections necessarily contain a large amount of morphological detail involving considerable

repetition. But the fault seems to be due also to a fear that the reader will have forgotten or overlooked or misunderstood the significance of something the author considers of great importance. This desire to be perfectly understood leads to an exceptionally large number of references to plates and figures and to other passages in the text, so that the reading tends to become slow and laborious, or if the references be ignored, it tends to be superficial. In the explanation of the plates, the author's care for details is shown to a marked degree. It is safe to say one rarely sees a volume in which the explanatory text for the plates is so complete. So far as the statements or interpretations of facts are concerned, the author's freedom from obvious error and from ill-judged conclusions is really remarkable. In all his references to other workers, Jackson shows not only an open-mindedness and fairness of judgment, but a courtesy even in disagreement that is delightful. At the same time, there is no glossing over of mistakes in earlier publications, no matter whether made by himself or some other authority. The perfectly evident desire to know the facts as they really are wins the reader's confidence and the unusual freedom from ambiguity prevents any misunderstandings.

The typographical work reflects the greatest credit on the Cosmos Press, especially when one considers the numerous tables with percentages often worked out to two decimals and the abundance of scientific names and technical terms. That slips of the pen and occasional transposed letters should occur is inevitable; the extraordinary thing is how very few there are in this volume. Nearly all have been detected and gathered together on the page of "Errata and Addenda" which follows the index, but they are mostly so trivial as to be of absolutely no importance. On page 188, however, the phrase "distinct continuous base" carries no meaning and we are therefore glad to have the Errata explain that it should read "discontinuous base." On page 251, we are told by the Errata, the words "starfish" and "sea-urchin" have been transposed in the author's discussion of *Paleodiscus,* an error which if uncorrected would seriously affect the argument. Two slips not noted in the "Errata," although not of great importance, may perhaps be worth pointing out. On page 121, in the footnote it is said that *Toxopneustes atlanticus* was described by Mr. Agassiz as *Leptechinus atlanticus;* the generic name should read *Lytechinus.* On page 238, the order Bothriocidaroida is inadvertently attributed to Jackson, 1896, whereas Duncan introduced the term in 1889.

When Alexander Agassiz's "Revision of the Echini" was published in 1872–74, it marked an epoch in the study of sea-urchins. It has literally been the foundation of all subsequent work throughout the world. It brought together and summarized the knowledge of echini as it stood at that time and much of the work it involved need never be done again. Jackson's "Phylogeny of the Echini" is a similar summing up of our knowledge to-day from the twentieth-century point of view and, like the "Revision," it marks an epoch. We are all to be congratulated that this fitting companion volume to the "Revision" is the work of an American zoologist; the Boston Society of Natural History is to be congratulated on the publication of a memoir of such unusual merit; and Dr. Jackson himself is most of all to be felicitated on the production of such a profound and masterly piece of research.

HUBERT LYMAN CLARK

The Parasitic Amœbæ of Man. By CHARLES F. CRAIG, M.D., Captain, Medical Corps, U. S. Army. 1911. J. B. Lippincott Company. Pp. 253. $2.50.

This book has no doubt been welcomed by many medical men, for it brings together the scattered literature in a complex field. In making such a compilation it is natural, perhaps, that the author should be biased by his own investigations. However, it is unfortunate that this fixed attitude should be so much in evidence throughout a work the purpose of which is to aid medical men in their studies of amœbic infections. A more critical